

BESSONOV, Lev Alekseyevich

[Nonlinear electric networks; a textbook for students in departments for advanced training of engineers and graduate students] Nelineinye elektricheskie tsepi; uchebnoe posobie dlia slushatelei fakul'teta usovershenstvovaniia inzhenerov, dlia aspirantov i diplomnikov. Moskva, 1958. 254 p.

(MIRA 13:8)

(Electric networks)

PHASE I BOOK EXPLOITATION

210

Bessonov, Lev Alekseyevich

Avtokolebaniya /avtomodulyatsiya/ v elektricheskikh tsepyakh so stal'yu (Self-Oscillation in Electric Circuits Containing Iron-cored Coils) Moscow, Gosenergoizdat, 1958. 303 p. 10,000 copies printed.

Ed.: Ayzenshtat, L.I.; Tech. Ed.: Borunov, N.I.

PURPOSE: The book is intended for engineers, graduate students and scientific personnel dealing with problems in automatic control, computer engineering, remote control and communications. It may also be used by senior students in the power and electrical engineering departments of vuzes.

COVERAGE: The book describes self-oscillation and other dynamic processes in ferroresonant circuits, magnetic amplifiers, magnetic trigger circuits, frequency multipliers and dividers, and coupled resonant circuits. The author thanks L.P. Neyman, Corresponding Member, USSR Academy of Sciences, for reviewing the manuscript and M.A. Babikov, Professor, Chairman of the Chair of Electrical Instruments of the Moscow Power Institute, for permission to use laboratory equipment for experimental work connected with the writing of this book. He al-

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Self-Oscillation in Electric Circuits (Cont.) 210

so thanks V.F. Nabatov for his help in conducting the experiment. There are 109 references, of which 82 are Soviet (including 3 translations), 17 English, 7 German, and 3 French.

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2. Derivation of the first relationship between the average value of inductance and peak value of a variable component of inductance for a period of driving voltage. External characteristic of a circuit	18
3. Analysis of relationship between μB and x in a resonant circuit undergoing magnetization. Special points	22

Card ~~2/11~~

BESSONOV, L.A.

Self-oscillations in a parallel inverter. Izv. vys. ucheb. zav.;
elektromekh. 1 no.5:112-115 '58. (MIRA 11:8)
(Mercury-arc rectifiers) (Oscillations)

BESSONOV, L.A., doktor tekhn.nauk, prof.

~~Multiphase~~ self-oscillatory systems with magnetic amplifiers
and the principle of flexible interconnection. Izv.vys.ucheb.
zav.; energ. no.6:48-52 Je '58. (MIRA 11:9)

1.Vsesoyuznyy nauchnyy energeticheskiy institut.
(Magnetic amplifiers) (Electric circuits)

~~BESSONOV~~ I. A. prof., doktor tekhn.nauk; RYBAKOV, M.S., dotsent, kand.
tekhn.nauk

Magnetic setups operating under asymmetric conditions. Trudy
VZEI no.9:103-115 '58. (MIRA 12:10)
(Magnetic amplifiers)

BESSONOV, L.A. ... prof., doktor tekhn.nauk

Self-oscillations in circuits with nonlinear capacitance. Trudy
VZNI no.9:116-119 '58. (MIRA 12:10)
(Electric circuits) (Oscillations)

BESSONOV, L.A., prof., doktor tekhn.nauk; RYBAKOV, M.S., dot sent, kand.tekhn.nauk

Superposed magnetization of ferromagnetic devices by alternating
current of operating frequency. Trudy VZEI no.9:120-127 '58.
(MIRA 12:10)

(Ferromagnetism)

9.4300

68130

SOV/144-59-2-5/19

AUTHOR: Bessonov, L.A., Doctor of Technical Sciences, Professor,
Head of the Chair

TITLE: The Theory of Oscillations⁷¹ in One of the Ferrresonant
Circuits

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika,
1959, Nr 2, pp 45 - 51 (USSR)

ABSTRACT: The arrangement in Figure 1 consists of two similar
transformers. Windings w_1^i and w_1^{ii} are connected in
series-aiding together with a sinusoidal voltage source
of frequency f . The other, secondary, windings w_2^i
and w_2^{ii} are opposed through the resistance R_2 and
capacitance C_2 . The primaries have equal turns, w_1 ; ✓
the secondaries have equal turns, w_2 . Various kinds
of oscillation are possible: periodic in instantaneous
value; aperiodic in instantaneous but periodic or
almost so in envelope value; shifting resonances;

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The Theory of Oscillations in One of the Ferroresonant Circuits

high-frequency oscillations; oscillations aperiodic for both instantaneous and envelope values. Previous work has been carried out by the author (Ref 2) and by others (Ref 1). The magnetization curve of the core materials is represented by a hyperbolic sine as in Eq (1). The ampere-turn balances are Eqs (2) and (3). The hyperbolic sine of a periodic argument can be represented as a Fourier series whose coefficients are Bessel functions of a purely imaginary variable. The fundamental components of primary and secondary currents are Eqs (5) and (6). The complete equation for secondary circuit including R_2 and C_2 is Eq (8) and substituting in it Eq (5) we arrive at the relation between fundamental components of primary and secondary induction, Eq (15). An oscillation at frequency f can only arise in the secondary circuit if the function

$$a_1^2 + b_1^2 = f(\beta B_2) \text{ is N-shaped as shown in Figure 3.}$$

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The Theory of Oscillations in One of the Ferroresonant Circuits

Eq (15) is satisfied when $\beta B_1 \neq \beta B_2$ in three different ways. Let a horizontal line be drawn in Figure 3 and the points of intersection with the N-shaped curve be m , n and s . Then the three cases are where βB_1 and βB_2 are defined by the pairs of abscissae (m,n) , (m,s) and (n,s) . The voltage at the terminals of secondary winding in Figure 1 is proportional to the vector difference of primary and secondary inductions, denoted here by B_{B1X} . Figure 4 shows the relationship between difference and sum (B_p) inductions for $a = 100$, $b = 10$. The latter constants depend on circuit values and are defined in Eqs (13) and (14). Figures 5, 6, 7 and 8 waveforms are shown for the case where the curve in Figure 4 is S-shaped and the source voltage has values of 15, 17.6, 18.7 and 25.6 V. In each case, the first three curves are: separate primary voltages; total input voltage.

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The Theory of Oscillations in One of the Ferroresonant Circuits

The third curve from the top is the output voltage across one winding and the lowest curve is the secondary current. Figure 5 shows the "jump" effect when the operating point in Figure 4 shifts from "a" directly to "e". Figure 6 shows a synchronized third sub-harmonic. Figure 7 is a periodic process in the region \star to u, while Figure 8 represents operation near ζ in Figure 4. When the resistance of the secondary circuit is relatively large self-modulation and sub-harmonics disappear. There is a similar change in behaviour when C_2 is made very large. Figures 9, 10, 11 and 12 show the input voltage and voltage across the capacitor for various values of R_2 and C_2 and saturation conditions. Figure 9 shows evidence of a strong third harmonic. Figure 10 is similar but shows an aperiodic character. Figure 11 is evidence of the "shifting resonance" mode in which the transition from low to high current occurs almost periodically. Figure 12 shows a strong second harmonic influence.

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SOV/144-59..2-5/19

The Theory of Oscillations in One of the Ferroresonant Circuits

There are appendices on the stability of a periodic process and formulae for phase-shift.

There are 12 figures and 2 references, 1 of which is Soviet and 1 English.

ASSOCIATION: Kafedra teoreticheskikh osnov elektrotekhniki,
Vsesoyuznyy zaochnyy energeticheskiy institut
(Chair of Theoretical Fundamentals of Electrical
Engineering. All-Union Correspondence Power Institute)

SUBMITTED: February 10, 1959

Card 5/5

SOV/24-59-2-27/30

AUTHOR: Bessonov, L. A. (Moscow)

TITLE: ~~On Changing the~~ Normal Rectification of a Bridge Rectifier
(O narushenii normal'nogo vypryamleniya v mostovoy
vypryamitel'noy skheme)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh
nauk, Energetika i avtomatika, 1959, Nr 2, pp 147-149 (USSR)

ABSTRACT: The circuit shown in Fig 1 consists of a source of the
sinusoidal e.m.f. with frequency f , the non-linear in-
duction L_1 , a rectifying bridge, a load (R_2, L_2) and
capacity C . Such a device is often used in an automatic
rectification and current control. If the switch k is
open, then a normal rectification of the alternative current
 i_1 takes place. With closing of the switch k_1 the cir-
cuit changes its normal character. The alternating current
 i_1 receives a constant component, as well as the odd har-
monics, while the even harmonics are obtained at the bridge
output. The current i_B adds the first harmonic to its
even harmonics together with a constant component. As an
example, an oscillogram for the moment of transition
(arrow) from the normal into the changed position is illus-

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On Changing the Normal Rectification of a Bridge Rectifier

trated in Fig 2, where $U = 25 \text{ V}$, $C = 29 \mu\text{f}$, $R = 92 \Omega$, $f = 50 \text{ h}$. It can be seen that the negative half of the current i_1 becomes greater than the positive half after commutation. Therefore, the hysteresis of the non-linear induction L_1 becomes asymmetric in respect of the origin of coordinates (Fig 3). This difference of tension in the adjacent sections of the bridge is maintained due to two causes: (1) The appearance of an additional (free) component of tension at the bridge output. This tension of the frequency f originates at the periodic commutation of the rectified current from one pair of valves into another. (2) The asymmetry in respect of the origin of coordinates of the points of the non-linear induction L_1 , the characteristics of which are represented by the function $B = f(H)$ (Fig 3). The frequency of the additional (free) oscillation depends on the capacity C . This is illustrated in Fig 4, showing the oscillograms of the output tension for a constant

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On Changing the Normal Rectification of a Bridge Rectifier

input but for different values of capacity: a - $C = 1 \mu\text{f}$,
b - $C = 4 \mu\text{f}$, v - $C = 29 \mu\text{f}$. The described process
will be stable if the frequency f of an additional com-
ponent is of the same magnitude as that of the e.m.f. A
similar result can be obtained also in other types of
rectification, such as the 3-phase type and others.
There are 4 figures.

SUBMITTED: January 8, 1959.

Card 3/3

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S/112/59/000/012/002/097
A052/A001

Translation from: Referativnyy zhurnal, Elektrotehnika, 1959, No. 12, p. 6,
23961

AUTHOR: Bessonov, L. A.

TITLE: Natural Oscillations in ^{rs}Circuits With Non-Linear Capacitances

PERIODICAL: Tr. Vses. Zaochn. energ. in-ta, 1958, No. 9, pp. 116-119

TEXT: In circuits with linear inductance and non-linear capacitance natural oscillation processes can emerge when the equilibrium point falls into the dropping section of the dependence of the constant component of voltage in non-linear capacitance on the constant charge component (in this point dynamic capacitance of slowly changing voltage and charge components is negative). By approximating the voltage characteristics on non-linear capacitance in relation to voltage by hyperbolic sine, the author gives the solution in the form of Bessel functions. Since electric circuits with non-linear conductances have looping dynamic characteristics they, like circuits with non-linear inductance, can convert the energy of frequency of the power source of the circuit into the energy whose frequency is not in a rational relation to it.

A. S. R.

Translator's note: This is the full translation of the original Russian abstract.
Card 1/1

BESSONOV, Lev Alekseyevich; IVANOV, I.A., red.; MURASHOVA, V.A.,
tekh. red.

[Theoretical principles of electrical engineering; in three
parts] Teoreticheskie osnovy elektrotehniki; v trekh
chastiakh. Izd.3. Moskva, Gos.izd-vo "Vysshaya shkola,"
1961. 791 p. (MIRA 15:3)
(Electric engineering)

BESSONOV, L.A.; DOMANSKIY, B.I.; DROZDOV, N.G.; D'YACHENKO, N.Kh.;
ZHEKULIN, L.A.; ZAYTSEV, I.A.; ZALESSKIY, A.M.; KAMENSKIY, M.D.;
KOSTENKO, M.P.; LEBEDEV, A.A.; LOMONOSOV, V.Yu.; MITKEVICH, A.V.;
SMIRNOV, V.S.; TOLSTOV, Yu.G.; USOV, S.V.; SHRAMKOV, Ye.G.

L.R. Neiman; on his 60th birthday and the 35th anniversary of
his educational work. Elektrichestvo no.6:93-94 Je '62. (MIRA 15:6)
(Neiman, Leonid Robertovich, 1902-)

KRUGLYANSKIY, Mikhail Samoylovich; BESSONOV, L.A., doktor tekhn. nauk,
prof., retsenzent; STEPANYUK, A.G., red.

[Handbook of electrical engineering] Elektrotekhnicheskii spravochnik. Belgorod, Belgorodskoe knizhnoe izd-vo, 1962. 479 p.
(MIRA 16:2)
(Electric engineering—Handbooks, manuals, etc.)

SIROTINSKIY, L.I.; POLIVANOV, K.M.; NETUSHIL, A.V.; BABIKOV, M.A.;
SYROMYATNIKOV, I.A.; DROZDOV, I.G.; FEDOSEYEV, A.M.; CHILIKIN, M.G.;
BESSONOV, L.A.; BUTKEVICH, G.V.; ZHEKULIN, L.A.; NEYMAN, L.R.;
GORTINSKIY, S.M.; SMIRNOV, A.D.; MAMIKONYANTS, L.G.; PETROV, I.P.

Vsevolod IUr'evich Lomonosov; obituary. Elektrichestvo no.12:88
D '62. (MIRA 15:12)

(Lomonosov, Vsevolod IUr'evich, 1899-1962)

BESSONOV, L.A., doktor tekhn. nauk, prof.; DEMIDOVA, I.G.; KOTOVA,
~~L.P.~~; LINNICHENKO, N.N.; OCHAN, V.V.; SEREDNETSKIY, L.M.;
VOSTROKNUTOV, N.G., retsenzent; OLEKSEYEVICH, V.P.,
retsenzent; FILARETOVA, A.S., retsenzent; ZARUDI, M.Ye.,
retsenzent; ZAIKA, Ye.V., st. prepod., retsenzent

[Textbook on the theoretical principles of electrical
engineering] Zadachnik po teoreticheskim osnovam elektro-
tekhniki. [By] L.A.Bessonov i dr. Moskva, Vses. zaachnyi
energ. in-t, 1963. 212 p. (MIRA 16:10)
(Electric engineering)

BESSONOV, L.A., doktor tekhn.nauk, prof. (Moskva)

New semiconductor diodes, regulated resistors, and magnetic elements.
Elektrichestvo no.2:1-6 F '63. (MIRA 16:5)
(Transistors) (~~E~~lectric resistors) (Electric engineering--Materials)

BESSONOV, L.A., doktor tekhn.nauk, prof (Moskva)

Accomplishments in the field of nonlinear circuits. Elektrichestvo no.3:
20-28 Mr '63. (MIRA 16:4)

(Electric networks)

BESSONOV, L.A.; RTEMOVA, T.I., red.; TUPITSYNA, L.A., red.;
FOTIYEV, V.M., red.

[Nonlinear electrical networks] Nelineinnye elektricheskie
tsepi. Izd.2., perer. i dop. Petrozavodsk, Vysshaya
shkola, 1964. 429 p. (MIRA 17:8)

BESSONOV, Lev Alekseyevich; IVANOV, I.A., red.

[Theoretical principles of electrical engineering in three
parts] Teoreticheskie osnovy elektrotekhniki v trekh cha-
stiakh. Izd.4. Moskva, Vysshaia shkola, 1964. 749 p.
(MIRA 17:10

L 41475-65 EWT(1)/EED-2/ENH(h) Pa-4/Pg-4/Pe6

ACCESSION NR AM5002551

BOOK EXPLOITATION

S/ 16
B+1

Bessonov, L. A.

Nonlinear electric circuits (Nelineyny ye elektricheskiye tsepi), 2d ed., rev. and enl., [Petrozavodsk], "Vysshaya shkola", 1964, 429 p. illus., biblio. 24,450 copies printed.

TOPIC TAGS: nonlinear electric circuit, electromodeling, magnetic-semiconductor equipment, autovibration, automatic modulation, subharmonic vibration, rectifier circuit, resonance phenomenon, trigger phenomenon

PURPOSE AND COVERAGE: This book examines general theoretical theorems, the general properties of electrical circuits with nonlinear resistances and phenomena observed in them, and the properties and principles of action of new types of nonlinear active, inductive, and capacitance resistances. New important uses of nonlinear resistances, including those based on relatively new and unknown phenomena, are considered. The use of nonlinear electrical circuits in electromodeling, computer technology, new types of negative dynamic parameters, magneto-semiconductor equipment, autovibrations, subharmonic vibrations, automatic modulation, resonance phenomena on high harmonics, dynamic phenomena in circuits with rectifiers, methods of calculating established and transient processes, and principles of

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the theory of stability of various types of motion are considered. Most of the problems that are considered are illustrated with numerical examples which makes the book suitable for independent study. The book is a textbook for students of higher technical education institutions studying the course of "Theoretical Principles of Electrical Engineering". It can also be recommended for engineers, graduate students, and researchers.

TABLE OF CONTENTS [abridged]:

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Ch. III. Nonlinear inductive and capacitance resistances -- 46

Ch. IIII. Approximation of the characteristics of nonlinear resistances -- 62

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Ch. VIII. Conversions using nonlinear circuits -- 180

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- Ch. IX. The use of nonlinear resistances to perform logical operations and new elements of high speed computers -- 212
- Ch. X. The use of nonlinear resistances in electromodeling -- 227
- Ch. XI. Magneto-semiconductor equipment -- 246
- Ch. XII. Negative differential parameters of electrical circuits and negative input resistances of bipoles -- 261
- Ch. XIII. Transient processes in nonlinear electrical circuits -- 275
- Ch. XIV. Principles of the theory of stability of nonlinear circuits -- 314
- Ch. XV. Autovibrations -- 328
- Ch. XVI. Automatic modulation -- 345
- Ch. XVII. Subharmonic vibrations -- 363
- Ch. XVIII. Some dynamic phenomena in rectifier circuits -- 378
- Ch. XIX. Resonance and trigger phenomena at high harmonics which interrupt resonances and certain other phenomena -- 388
- Ch. XX. Various types of vibrations in nonlinear electrical circuits -- 403
- Bibliography -- 417

SUBMITTED: 03Mar64

SUB CODE: DP, EC

NO REF SOV: 092
Card 3/3 *am*

OTHER: 028

BESSONOV, L.A.; BABAKOV, N.A., prof., retsenzent; HOLOBKOV, D.S.,
prof., retsenzent; TAREYEV, B.M., prof. doktor tekhn.
nauk retsenzent

[Principles of graph theory] Osnovy teorii grafov; ucheb-
noe posobie. Moskva, Vses. zaochnyi energ. in-t, 1964. 48 p.
(MIRA 19:1)

BESSONOV, L.A., doktor tekhn. nauk, prof. (Moskva)

Essential measures for the improvement of student training in
theoretical principles of electrical engineering. Elektrichestvo
no.8:83-85 Ag '63. (MIRA 16:10)

Phosphorescence of rock salt. L. P. Resonov. *Zhur. Eksp. Teor. Fiz. (J. Raptl. Theoret. Phys.)* 17, 1011-10 (1947). — (1) Phosphorescence of NaCl crystals (both grown from the melt and natural rock salt) annealed 1 hr. at 700°, decays following a simple exponential law, $I = I_0 e^{-t/\tau}$, in the temp. ranges 51-100° and 105-207°, whereas in the ranges 25-51° and 100-105° the decay curves, in coordinates $\log I(t)$, are composite. The temp. distribution curve of the initial brightness of phosphorescence shows 3 maxima, at about 25, 95, and 145°; the 1st 2 max. become weaker in crystals annealed at 650°, and disappear completely in samples annealed at 850°. The 3 max. correspond to 3 different processes, a, b, and c; in the range 25-51°, the $\log I(t)$ plot consists of 2 rectilinear branches, of different slopes, corresponding to a and b, with b decaying more slowly than a, in 100-105°, the 2 branches correspond to b and c, with c decaying more slowly than b whereas the single-slope lines (51-100° and 105-207°) correspond to b. From the initial and final slopes, values of a have been detd. separately for the processes a, b, and c and plotted as functions of the temp. (2) Temp. curves of the initial intensity of phosphorescence of NaCl crystals activated by Ni ions show 3 max., at 100° and at 240°, with a min. at 180°. The max. correspond to processes b and c. Curves of a values for these 2 processes, as a function of the temp., are very close, in position and in shape, to the corresponding curves of annealed NaCl. (3) A spontaneous mechanism of the decay process is excluded in the face of the observed strong effect

of the temp. Decay through decompn. of metastable centers with different levels and different activation energies would require that the growth of a with the temp. be the steeper, the higher the temp., whereas actually a increases more slowly with the temp. for the c process than for the b process. This behavior becomes readily understandable from the recombination point of view. At a sufficiently high temp. (c process), the no. of electrons in-

involved becomes equal to the no. of ionized centers, and the decay becomes hyperbolic rather than exponential, hence the slower growth with the temp. of a for the c process. The coincidence of the b and c curves for NaCl and for NaCl + Ni means that the systems of local levels, detd. by the host crystal, are identical in the two cases, although the emission centers are different. N. Thon

KRAGEL'SKIY, I.V.; BESSONOV, L.F.; SHVETSOVA, Ye.M.; REBINDER, P.A., akademik.

Contacting lapped surfaces. Dokl.AN SSSR 93 no.1:43-46 N '53. (MLRA 6:10)

1. Akademiya nauk SSSR (for Rebinder).

(Surfaces (Technology))

KORZHENEVSKIY, N.L.; DONTSOVA, Z.N.; KHASANOV, Kh.Kh., dots.;
VASIL'KOVSKIY, N.P.; SKVORTSOV, Yu.A.; POSLAVSKAYA, O.Yu.;
KOGAY, N.A., dots.; MAMEDOV, E.D.; AKULOV, V.V.; BABUSHKIN,
L.N., prof.; SHUL'TS, V.L., prof.; GORBUNOV, B.V.; GRANITOV,
I.I.; KOSTIN, V.P.; SMIRNOV, N.V., dots.; TSAPENKO, N.G.,
dots.; DEGTYAR', V.I.; CHERNOV, P.N.; MUKMINOV, F.G.;
SELIYEVSKAYA, A.A.; RYABCHIKOV, A.M.; DALIMOV, N.D., dots.;
LOBACH, Kh.S.; TADZHIMOV, T.; ARKAD'YEVA, A.N.; GAL'KOV,
Ch.V.; SHTARKLOVA, S.I.; BESSONOV, M., red.; BAKHTIYAROV, A.,
tekhn. red.

[The Uzbek S.S.R.] Uzbekskaia SSR. Tashkent, Gos.izd-vo
UzSSR, 1963. 483 p. (MIRA 16:8)
(Uzbekistan)

Bessonov, M. B.

24(1)

PHASE I BOOK EXPLOITATION SOV/3352

Vsesoyuzskaya konferentsiya, professorov i prepodavateley pedagogicheskikh institutov.

Primeneniye ul'trazvukov k issledovaniyu veshchestva; trudy konferentsii, vyp. 8 (Application of Ultrasonics in the Study of Matter; Transactions of a Conference, Nr. 8) Moscow, Izd. MOPI, 1959. 170 p. 1,000 copies printed.

Tech. Ed.: S. F. Zhitov.

PURPOSE: The book is intended for physicists, particularly those specializing in the field of ultrasonics.

COVERPAGE: This is a collection of 12 articles dealing with problems of acoustics, ultrasonics, and molecular physics. References are given at the end of each article.

Fredvoditelev, A. S. Dispersion of Acoustic Waves in Rarefied Gases. Article 1. 19

Zipir, A.-D., and V. P. Yakovlev. Pulse Method for Multiple Transformation of an Ultrasonic Signal in the Investigation of Liquid Media 63

Ilgunas, V., and E. Yaronis. On the Theory of Interferometers With Variable and Constant Length 67

Trelin, Yu. S. Some Results of Measurement of Ultrasonic Velocity in Gases by the Pulse Method 75

Volarovich, M. P., and D. B. Palashov. Investigation of Ultrasonic Velocity in Nitrogen Under Pressures up to 1050 kg/sq cm 83

Akhmetzhanov, K. O., and M. O. Shirkavich. Ultrasonic Velocity in Compressed Vapors of Ethyl Alcohol and Determination of Heat Capacities C_p and C_v 93

Perepechko, I. I. Ultrasonic Propagation in Rarefied Gases 103

Kuchera, P. On Some Conditions for Applicability of Racolt's Law for Solutions 115

Shilyayev, A. S., and B. R. Kudryavtsev. Ultrasonic Velocity and Surface Tension in Ternary Liquid Systems 121

Bessonov, M. B. Measuring Ultrasonic Velocity and Absorption in Solutions at High Temperatures 137 15

BESSONOV, M. I.

USSR/Chemistry - Physical chemistry

Card 1/2 : Pub. 147 - 7/27

Authors : Koton, M. M.; Kiseleva, T. M.; and Bessonov, M. I.

Title : Radical polymerization of styrene investigated by the marked atom method

Periodical : Zhur. fiz. khim. 28/12, 2137-2141, Dec 1954

Abstract : A study of styrene polymerization by means of marked atoms showed that benzoyl peroxide decomposes during the polymerization of styrene in mass forming $C_6H_5COO\cdot$ radicals, a majority of which attaches itself to the polymer. The benzoate $C_6H_5COO\cdot$ radicals are considered as the basic polymerization initiators. The separation of polymer chains during styrene polymerization in the presence of benzoyl peroxide takes place by the encounter of two growing chains or growing chain and benzoate radical but not by the transfer of chains. It was established that the number of benzoate radicals attaching themselves to the polymer depends upon the conditions of polymerization. An increase in temperature and in concentration of the basic benzoyl peroxide is followed by a reduction in the radical groups in the polymeric molecule and an increase in CO_2 in the gaseous phase. Seven references ; 3 USSR and 4 USA (1942-1953). Tables; graph; illustration.

Zhur. fiz. khim. 28/12, 2137-2141, Dec 1954

Card 2/2

Institution : Academy of Sc. USSR, Institute of High Molecular Compounds,
Leningrad

Submitted : January 29, 1954

BESSONOV, V. I.

(3) 5

1 Polymerization of styrene in the presence of benzoyl peroxide studied by the method of labeled atoms. M. M. Koton, T. M. Kiseleva, and M. I. Bessonov. *Doklady Akad. Nauk S.S.S.R.* 96, 85-6 (1954).—Treatment of PhMgBr with $C^{14}O_2$ gave C^{14} -labeled BzOH in 73-6% yield; this heated with PCl_5 gave labeled BzCl which, with H_2O_2 , gave $(PhC^{14}O)_2$, which was used for initiation of $PhCH:CH_2$ polymerization at 0.7-2% concn. and at 70°, 100°, and 140°. The solid polymer was reprecipitated from benzene by MeOH and ranged in mol. wt. from 19,400 to 30,600. From 1.3 to 1.73 labeled BzO radicals are found to be present per mol. of the polymer; a much smaller proportion of the peroxide decomposed with evolution of CO_2 ; this proportion rises with temp. and with increased catalyst concn. G. M. K.

BESSONOV, M. I., ZAKHAROV, S. K., KUVSHINSKIY, E. V., and LEBEDEV, G. A.

"Mechanical Rupture of Hard Polymer Materials."

report presented at the Conf. on Mechanical Properties of Non-Metallic Solids,
Leningrad, USSR, 19-26 May 1958.

Inst. of High Molecular Compounds , Acad. Sci. USSR, Leningrad.

BESONOV, M. I., S. K. ZAKHAROV, G. A. LEBEDEV, Ye. A. KUVSHINSKIY

"The Strength of Amorphous Bodies, Especially Polymers."

report presented at the Conference on Investigation of Mechanical Properties of Non-Metals, by the Intl. Society of Pure and Applied Physics and the AS USSR, at Leningrad, 19-24 May 1958.
(Vest. Ak Nauk SSSR, 1958, no. 9, pp. 109-111)

SOV/181-1-9-20/31

15(8)

AUTHORS:

Bessonov, M. I., Kuvshinskiy, Ye. V.

TITLE:

Cracks in Transparent Plastics, Their Growth and Structure

PERIODICAL:

Fizika tverdogo tela, 1959; Vol 1, Nr 9, pp 1441 - 1447 (USSR) 5'59

ABSTRACT:

In the present paper the authors describe an interference method for the investigation of cracks in the interior of a transparent material. They investigated the growth of cracks in samples of rectangular and round cross section from polystyrene and polymethyl methacrylate (PMMA) with 2% plastifier - dibutylphthalate. The cracks were produced by the action of some kg/mm^2 . Figure 1 shows a typical picture of microcracks formed in the PMMA in penetrating light. Figure 2 is a schematic representation of the possible observation directions. Next, the authors discuss the investigation results shown in numerous figures (photos are enlarged 22, 40, 60, or 120x). Figure 3a shows PMMA ($\sigma = .5 \text{ kg/mm}^2$, $t = 20^\circ\text{C}$) a side view in penetrating light; the cracks penetrate 0.2 to 0.3 mm into the depth of the material. Figure 2b shows the interference picture of such cracks; strip sets of the shape of cut parabolas superposing one another (Fig 2b'). Figure 4 shows

Cracks in Transparent Plastics, Their Growth and Structure SOV/181-1-9-20/31

the reconstruction of form and dimensions of such a crack (the interference picture was taken under green light with 0.53μ) carried out by means of the data obtained from the interference pictures. The angle from the crack walls enclosed in the central part, was found to be $\sim 25^\circ$, the distance between them at the surface $\approx 4\mu$. A small number of internal cracks was found in the sample interior (Fig 5). Figure 6 is a schematic representation of an instrument for the observation of the crack growth. Figure 7 shows a series of six pictures describing the crack growth in the various stages (PMMA, 4 kg/mm^2 , 20°C). Figures 8, 9, and 10 show pictures of individual cracks, figure 9 is the only picture showing cracks in polystyrene, figure 10 shows a single large crack in oriented PMMA. All details concerning the taking of such pictures are dealt with closely. There are 10 figures and 12 references, 9 of which are Soviet.

ASSOCIATION:

Institut vysokomolekulyarnykh soyedineniy AN SSSR Leningrad
(Institute of High-molecular Compounds of the AS USSR, Leningrad)

SUBMITTED:
Card 2/2

May 5, 1958

BESSONOV, M.I.; KUVSHINSKIY, Ye.V.

Certain characteristics of the destruction of annealed
polystyrene. Vysokom.sped. 1 no.10:1561-1565 0 '59.
(MIRA 13:3)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Styrene)

28(5)

SOV/32-25-9-35/53

AUTHORS:

Bessonov, M. I., Kuvshinskiy, Ye. V.

TITLE:

Determination of Creeping in Solid Polymers

PERIODICAL:

Zavodskaya laboratoriya, 1959, Vol 25, Nr 9, pp 1117-1120
(USSR)

ABSTRACT:

Since hitherto there had not been a generally used method and standard device to test the creeping (C) in polymers, the present paper describes a proper method used in the Institute mentioned in the Association. The tests are carried out at constant temperature and constant tensile stress of the sample. To record the course of accumulation of deformations the (C)-curves are plotted automatically, this being especially necessary when the speed of (C) is great, as under high tensions. Microsamples (Fig 1) were tested, which had been heated to 10 to 15° over the softening temperature (ST) beforehand and then slowly cooled down to room temperature. The (ET) of the sample is determined according to the method of the Institut fizicheskikh problem AN SSSR (Institute for Physical Problems of the AS USSR) (Ref 1). The graph of a horizontal thermal chamber (Fig 2); in which stretching is

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SOV/32-25-9-35/53

Determination of Creeping in Solid Polymers

carried out under observation of the sample deformation through a measuring microscope and recording the deformation by an electric rheochord transmitter, as well as showing the loading mechanism, is presented. The latter can work in two ways - with a disc and counter weight, as well as with a figured eccentric. Calculation methods for the two types of loading are mentioned. Visual deformation measurements are usually made without correction for "boundary effect". The above mentioned transmitter was linked to a bridge circuit (Fig 4), this again linked to a recording potentiometer of type EEP-09 (scale 30 mv). The absolute maximum measuring error of deformation was ± 0.005 mm. The temperature stabilization in the abovementioned chamber was achieved by means of a direct current - bridge circuit of type UMV and a governing millivoltmeter of type MRShchPr and was $\pm 0.5^\circ$ within the temperature range $+20$ to $+200^\circ$. There are 4 figures and 8 references, 3 of which are Soviet.

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80V/32-25-9-35/53

Determination of Creeping in Solid Polymers

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR
(Institute for High Molecular Compounds of the Academy of
Sciences, USSR)

Card 3/3

BESSONOV, M.I.; KUZNETSOV, M.P.

Influence of time on the strength of oriented polymethylmethacrylate. Vysokom.sped. 1 no.5:761-767 My '59. (MIRA 12:10)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Methacrylic acid)

BESSONOV, M. I. Cand Phys-Math Sci -- "Study of the mechanical destruction of solid
amorphous polymers." Len, 1960 (Acad Sci USSR. Phys-Tech Inst). (KL, 1-61, 178)

S/122/60/000/007/005/011
A161/A029

AUTHORS: Bessonov, M.I., Engineer; Zakharov, S.K., Engineer; Kuvshinskiy, Ye.V., Doctor of Physics and Mathematics

TITLE: Experience in Determining the Mechanical Properties of Plastics in Microspecimens

PERIODICAL: Vestnik mashinostroyeniya, 1960, No. 7, pp. 41 - 45

TEXT: A new mechanical test system for plastics, requiring specimens of only 30 to 50 g (100 times less than in the existing test methods), has been developed by Institut vysokomolekulyarnykh soyedineniy AN SSSR (High-Molecular Compounds Institute of the AS USSR) in cooperation with industrial institutes. The test system includes tests for softening temperature, specific impact resistance and tension, and, for specific cases, for creep and long-time strength (Ref. 2). The specimens are disks of 10 mm in diameter and 4 or 2 mm thick, 10x10x4 and 15x10x4 mm plates, and two-lateral blades of 15 to 35 mm long, up to 4 mm wide and with 8 mm transition radii. The softening point is determined in an ИФП (IFP) apparatus (Fig. 1) developed by A.P. Aleksandrov and Yu.S. Lazurkin and built in the workshops of Institut fizicheskikh problem AN SSSR (Institute of Physical

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S/122/60/000/007/005/011

A161/A029

Experience in Determining the Mechanical Properties of Plastics in Microspecimens

Problems of the AS USSR). The apparatus consists of a copper tray with eight cavities for specimens, a heater placed between the tray and the asbestos cover, a resistance thermometer of 0.1 mm nickel wire wound on mica, an asbestos-lined hood and a support with dial indicator. The thermostatic system is illustrated by a diagram (Fig. 1b). The test consists in determining the penetration depth of a needle (Fig. 2). The curve shape, as in this graph, shows the difference between a "linear" plastic, like organic glass, and "three-dimensional", like eb-onite and escapon. The softening point is easily found for the "linear" plastics, only approximately for "loosely joined" (escapon) and not at all for "firmly joined". The "IFP" test takes 4 - 8 h. Impact resistance is tested with a "Din-stat" pendulum frame described in a French source (Ref. 4) on a plate specimen; the tension test machine is shown in a diagram (Fig. 4) and is used for finding the normal modulus of elasticity, relative elongation in rupture, etc. As is known, the mechanical characteristics of plastics very considerably depend on the speed with which the load is applied, and on temperature, but there is yet no industrial machinery for determining such characteristics on "microspecimens" and the described special machine (Fig. 4) had to be built. Detailed design descrip-

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A161/A029

Experience in Determining the Mechanical Properties of Plastics in Microspecimens

tion is given. Figure 4b shows pickups of the machine connected into a bridge fed from a "ЗГ-10" (ZG-10) sound generator by 6 volt current with a 5,000 cycles frequency. The bridge unbalance is proportional to the applied load and is amplified. The applied force ranges are 0 - 5 kg, 15 - 30 kg and 60 - 200 kg, the accuracy is within 1% of the limit load; the thermostatic and cryostatic system makes possible tests in a temperature range between -120 and +250°C. The elongation diagram is recorded on tape. As can be seen in two graphs (Fig. 6), where the results of tests with normal and "micro"-specimens on organic glass and ebonite are compared, the "microspecimens" show practically the same results. It is mentioned that the new test system is analogous to the tests described in Reference 1. The tests are in use since 1954. There are 6 figures and 5 references: 2 Soviet, 2 English and 1 French.

Card 3/3

BESSONOV, M.I.; KUVSHINSKIY, Ye.V.

Relation between the static breakdown and deformation of
solid amorphous polymers. Vysokom. soed. 2 no. 3:397-403
Mr '60. (MIRA 13:11)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Polymers) (Strains and stresses)

15 (3), 28 (5)

AUTHORS:

Kuvshinskiy, Ye. V., Bessonov, M. I.,
Zakharov, S. K., Sidorovich, A. V.

S/032/60/026/01/003/052

B010/B123

TITLE:

Answers to the Inquiry About the Test Methods of the Physical
and Mechanical Properties of Plastics

I

PERIODICAL:

Zavodskaya laboratoriya, 1960, Vol 26, Nr 1, pp 7 - 8 (USSR)

ABSTRACT:

The test method and the dynstat type apparatus (Ref 1) may be recommended for the evaluation of the brittleness of plastics. In the institute of the authors successful tests on micro-samples were carried out (Ref 2), which can be further recommended. For determining the connection of the structure of plastics and their physical and mechanical properties, two facts have to be considered: If the influence of the structure upon a certain property is to be evaluated, the characteristics of only this property may be determined. If, however, differences of two (or more) plastics are to be investigated, the thermomechanical properties must be investigated within a wide temperature range and with varying stress. Tensile strength during expansion (and bending) is only to be

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Answers to the Inquiry About the Test Methods of S/032/60/026/01/003/052
the Physical and Mechanical Properties of Plastics I B010/B123

determined at a single standard deformation rate (but not load rate) which can be easily reproduced. At the same time the durability and creep is to be determined of plastics. For determining the heat resistance of plastics the upper limit of temperature of usability of finished products should be fixed and not of the plastic itself, as it depends on the purpose of usability of the finished product. Therefore, the determination technique cannot be universal. The existing apparatus for determining the heat resistance of plastics (Martens, Vick) are technically imperfect and must be substituted by new and modern constructions. The indirect evaluation method of the density determination can be regarded as simple and universal method of determining the degree of crystallization. There are 6 references, 5 of which are Soviet.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR
(Institute of High Molecular Compounds of the AS USSR)

Card 2/2

S/032/60/026/012/018/036
B020/B056

AUTHORS: Bessonov, M. I., Vashchenko, V. S., and Kuvshinskiy, Ye. V.

TITLE: Determination of the Surface Cracking Resistance of
Transparent Plastic Materials on Wedge-shaped Samples

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 12,
pp. 1390-1391

TEXT: The surface cracking resistance may be characterized by means of the tensile stress, at which the first visible cracks occur within a given time interval after application of load, or by determining the surface under stress in the case of a pure bending test, at which the first cracks occur. A further possibility is offered by the occurrence of cracks on the surface of plastic materials sometimes after having been wetted with organic liquids. For being able to judge the surface cracking resistance, these methods are, however, unsuited. V. R. Regel' (Ref. 7) suggests the curve $\tau_0 = f(\sigma)$, i.e., the determination of the time interval τ_0 from the instant of stress being applied to the sample up to the occurrence of the first cracks as a function of the tensile stress σ for the purpose of characterizing the surface

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Determination of the Surface Cracking S/032/60/026/012/018/036
Resistance of Transparent Plastic Materials B020/B056
on Wedge-shaped Samples

cracking resistance of plastic materials. In the present paper, it is also suggested to characterize surface cracking resistance by means of the relation $\tau_0 = f(\sigma)$, where the sample has the shape of a truncated wedge. The

cracks at first occur in the narrow sections of the sample, and only later on the broader sections. A cracking front forms, which gradually shifts from the narrower to the broader sections of the sample. The width of the sample at the place of the "front" is periodically measured, the time since the beginning of the stress is noted, and from the thickness of the sample and the tensile force, the tensile stress corresponding to τ_0 is calculated.

The wedge-shaped samples (Fig. 1) were sawed with a circular saw. The angle of the wedge was about 5° , the maximum width of the sample was 8-9 mm, and its minimum width 3 to 3.5 mm. The thickness of the samples was 1-4 mm, and their full length 55-60 mm. Before the experiments were made, the samples were heated to a temperature, which was higher by $10 - 20^\circ$ than the fusion point of the given material. In the case of the shape of the samples selected, the stress dropped from the minimum to the maximum section to about the half of its former amount. The results obtained

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Determination of the Surface Cracking S/032/65/026/012/018/036
Resistance of Transparent Plastic Materials B020/P056
on Wedge-shaped Samples

by wedge-shaped and ordinary samples were in good agreement (Fig. 2). For the purpose of calculating the relation $\tau_0 = f(\sigma)$, in the first case two, and in the second case 11 samples were used. The total time needed for the investigation, using a test cell, was in the first case about 8, and in the second case about 18 hours. There are 2 figures and 8 references: 4 Soviet, 3 US, and 1 German.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR
(Institute of Highmolecular Compounds of the Academy of
Sciences USSR)

Card 3/3

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2409, 1372

S/191/61/000/005/002/003
B124/B218

AUTHORS: Bessonov, M. I., Kuvshinskiy, Ye. V.

TITLE: The relationship between destruction, deformation, and cracking of solid amorphous polymers

PERIODICAL: Plasticheskiye massy, no. 5, 1961, 57-63

TEXT: The principal results of studies performed in recent years on the relation between the destruction of solid amorphous polymers and their creep and cracking are presented. The relationship between temporary dependences of the strength of solid amorphous polymers and their creep is first dealt with (Fig. 1). The common exponential relation between life and stress of the type $\tau = Ae^{-\alpha\sigma}$ holds only for acetyl cellulose in the whole range of temperatures and stresses concerned. In every test, the creep curve was determined until the specimen cracked. Fig. 2 shows the creep curve of acetyl cellulose (AC) in the coordinates ϵ and $\log \tau$. At any stress, creep curves of AC must be S-shaped. In general, the creep curve of the polymer in the coordinates ϵ and $\log \tau$ must be S-shaped. This is an indication of the complicated time dependence of the rate of creep

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S/191/61/000/005/002/003
B124/B218

The relationship between destruction...

deformation accumulation. Experimentally, the dependence of $\log \tau$ on $\log (1/v)$ for ebonite at 20, 40, and 60°C, for AC at 60°C, for a copolymer of methylmethacrylate and methacrylic acid (CMMA) at 20°C, and for polystyrene (PS) at 20°C yielded a straight line. The relation between τ and v can be expressed by the empirical equation $1/\tau = v^m/c$ (m and c are constants depending on temperature and the type of polymer). This relation indicates that destruction and deformation are entirely different, interdependent processes. Destruction and deformation rates change unproportionally with varying stress. This is illustrated by Fig. 4. Heating tests indicate that destruction is a local process covering small areas of the material. Therefore, it is not directly related to the deformation accumulation in the entire specimen. The destruction was examined by a microscopic study of the cracking of solid, amorphous, transparent polymers (organic glasses). When transparent polymers crack, their cracks glitter intensely in the reflected light. The authors developed the so-called "face" process for observing such cracks (M. I. Bessonov, Ye. V. Kuvshinskiy, FTT, 1, 1441 (1959)). The dumbbell-shaped specimen is put on the microscope stage and subjected to constant tensile stress (Fig. 5). The faces of the specimen are polished. Observations are made in reflected light, using

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3124/B218

The relationship between destruction...

a microscope of large focal distance, and a reflector. After the loading of the cross-sectional edges, a glittering ring appears, which later broadens gradually. A series of interference figures is observed. With a given tensile stress, cracks grow at a constant rate, while the growth of ordinary cracks is accelerated. Unlike what is the case with ordinary cracks, the modulus of elasticity of a specimen with "silver" cracks does not depend on their enlargement, and the rate of growth of "silver" cracks depends, not on the amount of stress at the end of the crack, but on the mean stress acting upon the specimen. Fig. 7 shows examples. The formation of "silver" cracks may be considered to be a primary stage of polymer destruction. Fig. 11 shows the enlargement of cracks in polymers. There are 11 figures and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: I. Benbon, F. Roessler, Proc. Phys. Soc., 70, 201 (1957).

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20142

15.8500

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S/181/61/003/002/040/C50
B102/B201

AUTHORS: Bessonov, M. I. and Kuvshinskiy, Ye. V.
TITLE: Characteristic features in the development of destructive cracks in solid polymers
PERIODICAL: Fizika tverdogo tela, v. 3, no. 2, 1961, 607-610

TEXT: A study has been made of the microscopic growth and the structure of destructive cracks in an organic glass (polymethyl methacrylate + 6% di-butyl phthalate). The authors worked by the method of controlled destruction, where a single destructive crack forms by a slow and flat development; the experiment is graphically represented in Fig. 1. The specimen dimensions were $50 \times 20 \times 4 \text{ mm}^3$. A microscope with large focal length was used for the observations made at room temperature in the direction denoted by 1. Two groups of interference fringes were observed near the tip of the crack, during observations in the reflected light: a group of very distinct narrow fringes on the tip of the crack, and a group of broad blurred fringes behind these (this is not observable in the transmitted light). If the crack grows, the narrow fringes move ahead with it, without changing their shape.

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Characteristic features in ...

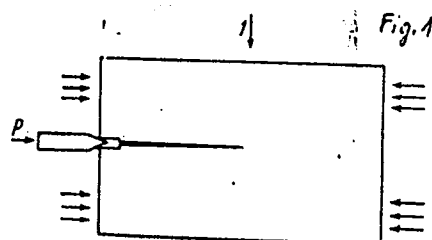
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B102/B201

The broad fringes change their shape and shift, the slit surface displays a reddish coloring (in the reflected light) which, however, disappears on heating. Results are compared with those of a previous paper (Ref. 7: FTT, 1, 1441, 1959) in which the authors studied the structure and the growth of cracks formed in "silver" by the impression of transparent solid polymer into the latter. There are 3 figures and 9 references: 5 Soviet-bloc and 3 non-Soviet-bloc. X

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy AN SSSR Leningrad
(Institute of High-molecular Compounds AS USSR, Leningrad)

SUBMITTED: July 2, 1960

Fig. 1



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BESSONOV, M.I.; KUVSHINSKIY, Ye.V.

Kinetics of the growth of "silver" cracks in transparent solid polymers.
Fiz.tver.tela 3 no.5:1314-1323 My '61. (MIRA 14:6)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR, Leningrad.
(Polymers)

BESSONOV, M.I.; KUVSHINSKIY, Ye.V.

Using the FMT 3 apparatus for determining the microhardness
of polymers. Zav.lab. 28 no.4:504-505 '62. (MIRA 15:5)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Polymers...Testing)
(Hardness)

BESSONOV, M.I.; RUDAKOV, A.P.

Studying the stresses occurring during the heating of fibers
made from polyvinyl alcohol. Khim. volok. no.2:30-35 '64.
(MIRA 17:5)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.

ACCESSION NR: AP4034911

S/0181/64/006/005/1333/1342

AUTHORS: Bessonov, M. I.; Rudakov, A. P.

TITLE: The phase state of polyvinyl alcohol

SOURCE: Fizika tverdogo tela, v. 6, no. 5, 1964, 1333-1342

TOPIC TAGS: polyvinyl alcohol, phase transition, double refraction, polymer, polarizing microscope MP 3

ABSTRACT: On the whole, the capacity of polyvinyl alcohol to crystallize is supported by a great amount of experimental data reported in the literature. But direct observation of first-order phase transitions, determination of melting point, and knowledge of other pertinent data have been lacking. The authors attempted to fill this gap. They investigated the temperature transformations in films of polyvinyl alcohol by means of x-ray studies and by measurements on changes in density, elasticity modulus, and microscopically observable double refraction. An MP-3 polarizing microscope with long-focus objectives and with heating stage was used to observe changes in double refraction. The initial films exhibited no birefringence, but a slight effect was noted at 150-160C, which disappeared at 230-235C. Samples cooled quickly from this temperature (to -110C) still showed no

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ACCESSION NR: AP4034911

birefringence, but slowly cooled samples did display the property, at 202-204C. Density was found to change sharply at about 220-230C (in melting zone) and at 190-210C (in crystallization range). First-order transition was observed, and the authors conclude that polyvinyl alcohol is a crystalline polymer with a melting point of 232C. Orig. art. has: 6 figures.

ASSOCIATION: Institut vyssokomolekulyarnykh soedineniy AN SSSR, Leningrad
(Institute of High-Molecular Compounds AN SSSR)

SUBMITTED: 10Nov63

SUB CODE: OC, SS

NO REF SOV: 009

ENCL: 00

OTHER: 009

Card 2/2

L 6636-65 EPA(s)-2/EWT(m)/EPP(s)/EPR/EWP(j)/T Pc-4/Pr-4/Pa-4/Pt-10/

P3-4 BSE/ASD(a)-5 WW/RM

ACCESSION NR: AP4040527

S/0080/64/037/006/1349/1355

AUTHOR: Afanas'yeva, G. N.; Bessonov, M. I.; Vol'f, L. A.; Meos, A. I.; Frenkel', S. Ya.

TITLE: Study of the thermomechanical properties of high strength polyvinylalcohol fibers by the isometric method

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 6, 1964, 1349-1355

TOPIC TAGS: polyvinylalcohol fiber, high strength fiber, isometric test method, thermomechanical property, thermally stabilized fiber, cord fiber, acetalated fiber, heat stretched fiber, fiber stretching, fiber shrinkage, elongation, chemically treated fiber, orientation, fiber orientation index

ABSTRACT: The physical and technological properties of high strength polyvinylalcohol (PVA) fibers obtained by thermally plasticized stretching at temperatures near the softening temperature were studied. Tests were run on an automatic apparatus provided with a highly sensitive compensating dynamometer, as described by A. P. Rudakov (Avtomatizirovanny*y dinamometr dlya ispy'taniya plenok i volokon i opyt ego ispol'zovaniya. (Automated dynamometer for testing films and fibers

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L 6636-65

ACCESSION NR: AP4040527

and testing of its applications), IX nauchnaya konferentsiya IVS AN SSSR ¹⁰7. Tests were run in air and in inert atmosphere at different rates of heating on freshly formed fiber, on cord fiber, on fiber subjected to thermal stabilization and fiber acetalated with formaldehyde. The heat-formed stresses in rigidly fixed samples heated at 2.7 C/min. are shown in fig. 1. The low temperature maxima resulted from drying the fiber; the high temperature maxima are characteristic of the degree of fiber orientation. The magnitude of the stress at the maximum can serve as an index to the oriented state of the fiber. The hot-stretched fiber has the best indexes for the degree of orientation and also for modulus of elasticity, deformation range. The untreated and chemically treated fibers do not show sharp maxima. The low values in the formaldehyde-treated fiber are indicated due to the limited segmental mobility of the macromolecules bound to the acetal bridges; the rise at 225-240C is due to the breaking of these bridges. At a greater rate of heating the maxima are shifted somewhat toward higher temperatures. The high strength fiber shows no deformation when subjected to small loads (1.76 kg/mm²) at regularly increased temperature, until the 200-220C range, where it actually shrinks. Shrinkage stops as the temperature approaches 240C, the softening point of the

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L 6636-65

ACCESSION NR: AP4040527

polymer. At higher loadings (5.27, 10.53 kg/mm²) the relaxation stresses of the fiber are exceeded at 80 and 60C causing some elongation, but the high strength fiber still retains most of its properties up to 180-190C. Orig. art. has: 5 figures.

ASSOCIATION: Leningradskiy tekstil'nyy institut imeni S. M. Kirova 1 (Leningrad Textile Institute); Institut vy'sokomolekul yarnykh soedineniy AN SSSR (Institute of Macromolecular Compounds)

SUBMITTED: 09May63

ENCL: 01

SUB CODE: MT

NO REF SOV: 007

OTHER: 002

Card 3/4

L 6636-85

ACCESSION NR: AP4040527

ENCLOSURE: 01

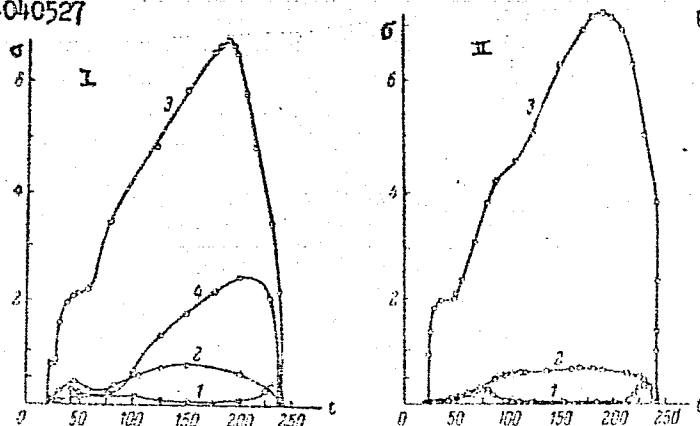


Fig. 1. Isometric curves for heating fiber in air (I) and in helium (II).
t--temperature (°C), σ --loading (kg/mm²). Fiber: 1--reacted with formaldehyde;
2--original (freshly prepared); 3--high strength; 4--cord fiber.

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L 38585-65 EWT(m)/EPT(c)/EWP(j)/EHA(c) Pe-h/Pr-h FM

ACCESSION NR: AP5010583

UR/0020/65/161/003/0617/0619

AUTHOR: Rudakov, A. P.; Bessonov, M. I.; Pokrovskiy, Ye. I.;
Fedorova, Ye. F.; Koton, M. M. (Corresponding member AN SSSR)

TITLE: High-temperature isomeric conversions in polyimides

SOURCE: AN SSSR. Doklady, v. 161, no. 3, 1965, 617-619

TOPIC TAGS: polyimide, polymer, cross linking, thermal treatment

ABSTRACT: Pyromellitic dianhydride, biphenyltetracarboxylic dianhydride, and the dianhydride of an aliphatic tetracarboxylic acid [sic] were condensed with diaminodiphenyl ether and benzidine in dimethylformamide at 15C. The resulting solutions of a series of representative polyimides were used to form polyimide films, which were then subjected to thermal treatment. Infrared, gravimetric, and dielectric measurement data indicated that dehydrocyclization (imidization) is essentially complete at 250C. However, additional thermal treatment at 300-400C results in a somewhat unexpected considerable increase in elasticity. Since any destructive thermal effects would decrease

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L 38585-65

ACCESSION NR: AP5019583

elasticity, and since crystallization is disproved by x-ray data, it was concluded that at higher temperatures cross-linking occurs, probably by opening of individual imide rings incorporated in the macromolecules and subsequent formation of imide cross-links between separate macromolecules. This is supported by attenuation of the 1780 cm^{-1} band associated with carbonyl groups in five-membered rings. Further support for cross-linking is provided by thermomechanical tests on the above films. Intermolecular isomerization of this type may be utilized to control the properties of other thermosetting plastics. Orig. art. has: 3 figures, 1 table, and 1 formula. [VS]

ASSOCIATION: Institut vysokomolekulyarnykh soedineniy Akademii nauk SSSR (Institute of Macromolecular compounds, Academy of Sciences, SSSR)

SUBMITTED: 05Nov64

ENCL: 00

SUB CODE: OC, TD

NO REF SOV: 000

OTHER: 005

ATD PRESS: 3227

Card 2/2

L 64483-65 EWT(m)/EPF(c)/ENF(j) RPL RM

ACCESSION NR: AP5021279

UR/0020/65/163/005/1143/1146 45

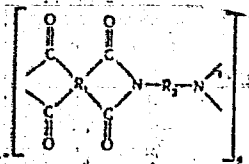
AUTHORS: Boldyrev, A. G.; Androva, N. A.; Bessonov, M. I.; Kuvshinskiy, Ye. V.;
Rudakov, A. P.; Florinskiy, F. S.; Koton, M. M. (Corresponding member AN SSSR) 42

TITLE: Free radical investigation in polyamides by E.P.R. method

SOURCE: AN SSSR. Doklady, v. 163, no. 5, 1965, 1143-1146

TOPIC TAGS: epr spectrum, polyamide, polymer, resin, polyamide acid

ABSTRACT: A. P. Rudakov, M. I. Bessonov, M. M. Koton, i dr. (DAN, 161, 3, 1965) have shown that heating of polyamide acids to 80-200°C leads to a liberation of water and the formation of polyamide cyclic compounds. The authors of the present paper studied the nature of free radicals formed during the above reaction. The polyamides studied had the structure



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L 64483-65

ACCESSION NR: AP5021279

On the basis of epr measurements, three types of radicals were detected. The kinetics of free radical accumulation was studied by gradual heating of specimen, and the results are shown graphically. It is concluded that during heating of polyamide acids two processes occur: a reversible one and an irreversible one. The reversible change is attributed to processes taking place in one and the same imide ring, whereas the nonreversible changes are attributed to the recombination of free radicals belonging to two different macromolecules. Radicals having the structure $-C=O$ were not detected. Orig. art. has: 4 graphs. 2

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy, Akademii nauk SSSR
(Institute for High-Molecular Compounds, Academy of Sciences SSSR) _{44,55}

SUBMITTED: 13Mar65

ENCL: 00

SUB CODE: 00

NO REF SOV: 003

OTHER: 000

llc
Card 2/2

L 00992-66 EPA(s)-2/ENT(m)/EPF(c)/ELP(j)/T WW/RM
 ACCESSION NR: AP5019567

UR/0191/65/000/008/0034/0038
 678.742'547.785.5-416.01:539.3

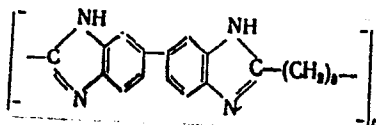
AUTHOR: ^{44,55}Layus, L. A.; ^{44,55}Bessonov, M. I.; ^{44,55}Adrova, N. A.; ^{44,55}Koton, M. M.

TITLE: Physicomechanical properties of poly-2-octamethylene-5,5'-dibenzimidazole ⁴⁰₃₉ ⁷

SOURCE: Plasticheskiye massy, no. 8, 1965, 34-38

TOPIC TAGS: heat resistant ^{44,55}polymer, polybenzimidazole

ABSTRACT: The mechanical properties and ¹⁵heat resistance of isotropic and oriented films of poly-2-octamethylene-5,5'-dibenzimidazole



films of various molecular weights have been studied in a wide range of temperatures. The films were deposited from formic acid solutions. Testing involved thermomechanical and thermogravimetric measurements and measurements of tensile strength, elongation.

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L 00992-66

ACCESSION NR: AP5019567

3
gation, and modulus of elasticity at various temperatures. The data are given in graphic form. On the basis of the data, optimum conditions for film drying and orientation stretching were selected. The results showed that the polymer is suitable for producing high-grade polymer films. In addition to good strength, elasticity, and thermal stability, the films also showed good dielectric properties. Film mechanical strength could be considerably increased by orientation stretching in the softened state: tensile strength attained 5000 kg/cm² while film elasticity and flexibility met the most stringent specifications [Sic]. The polymer was considered to be of considerable interest as a material for films suitable for construction, electrical and thermal insulation purposes and for fibers suitable for long-time service at temperatures up to 200C. Orig. art. has: 9 figures and 1 formula. [SM]

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: OC,GC

NO REF SOV: 006

OTHER: 002

ATD PRESS: 4068


Card 2/2

SIDOROVICH, A.V.; BESSONOV, M.I.; RUDAKOV, A.P.; KOTON, M.M.

Thermographic and dilatometric study of polypyromellitimide.
Dokl. AN SSSR 165 no.4:848-850 D '65.

(MIRA 18:12)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
2. Chlen-korrespondent AN SSSR (for Koton).

L 8127-66 EWT(m)/EWP(j)/EWA(c) RPL JW/RM

ACC NR: AP5025021

SOURCE CODE: UR/G286/65/000/016/0081/0081

AUTHORS: Koton, M. M.; Kudryavtsev, V. V.; Rudakov, A. P.; Bessonov, M. I.

ORG: none

TITLE: Method for obtaining polyimides. Class 39, No. 173931 [announced by the
Institute for High-Molecular Compounds, AN SSSR (Institut vysokomolekulyarnykh
soyedineniy AN SSSR)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 16, 1965, 81

TOPIC TAGS: polyimide, diamine, polycondensation

ABSTRACT: This Author Certificate presents a method for obtaining polyimides by the
polycondensation of aromatic diamines and the dianhydride of tetracarboxylic acid.
To increase the variety of polyimides, the dianhydride of butanetetracarboxylic-1,2,
3,4 acid is used as the starting material.

SUB CODE: OC/ SUBM DATE: 20Oct64

nw
Card 1/1

UDC: 678.675.4'4.002.2

L 17625-66 EWT(m)/EWP(j)/T/ETC(m)-6 WW/RM

ACC NR: AP6001731

SOURCE CODE: UR/0020/65/165/004/0848/0850

AUTHORS: Sidorovich, A. V.; Bessonov, M. I.; Rudakov, A. P.; Koton, M. M.
(Corresponding member AN SSSR)

ORG: Institute for High-Molecular Compounds, Academy of Science, SSSR (Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR)

TITLE: Thermographical and dilatometrical investigation of polypyromellitimide

SOURCE: AN SSSR. Doklady, v. 165, no. 4, 1965, 848-850

TOPIC TAGS: polymer, polyamide, polymer physical chemistry, polymer chemistry, amorphous polymer, thermal analysis

ABSTRACT: The effect of temperature on the state of aggregation of polypyromellitimide was investigated by differential thermal analysis and dilatometry. The experimental procedure followed is described by A. V. Sidorovich and Ye. V. Kuvshinskiy (Zav. lab., 25, No. 9, 1124, 1959). The experimental results are presented graphically (see Fig. 1). It is concluded that, after being subjected to a complete annealing cycle, the polypyromellitimide does not change its state

Cord 1/2

UDC: 536.717+541.6

L 17625-66

ACC NR: AP6001731

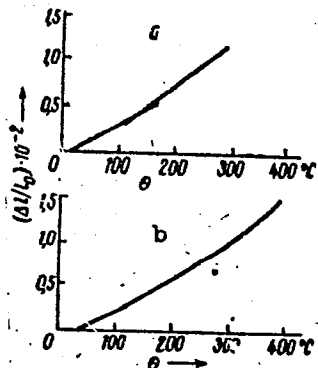


Fig. 1. Dilatometric measurements.
Film III (imidized) a - thermal
extension during first heating;
b - thermal extension after several
heating cycles (heating - cooling).

of aggregation in the temperature interval 20--400°C. Orig. art. has: 3 graphs.

SUB CODE: 07/ SUBM DATE: 30Jun65/ ORIG REF: 004 OTH REF: 001

FW
Card 2/2

(A) L 11235-66 EWT(m)/EWP(j)/T/EWA(c)/ETC(m) VNI/RM
 ACC NR: AP6002214 SOURCE CODE: UR/0080/65/038/012/2728/2734
 AUTHOR: Koton, M. M.; Yakovlev, B. I.; Rudakov, A. P. Knyazeva, T. S.; Florinskiy, F. S.; Bessonov, M. I.; Kuleva, M. M.; Tolparova, G. A.; Layus, L. A.
 ORG: Institute of Macromolecular Compounds, AN SSSR (Institut vysokomolekulyarnykh soyedineniy AN SSSR)
 TITLE: Preparation and physicomechanical properties of polypyromellitimide
 SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 12, 1965, 2728-2734
 TOPIC TAGS: heat resistant plastic, fire resistant material, dielectric material, polyimide, polypyromellitimide/~~polyimide~~
 ABSTRACT: A study has been made of the preparation and physical and mechanical properties of a polyimide, viz., polypyromellitimide. Test results showed that the polymer may find widespread use as a heat resistant and low temperature resistant material, and is of special interest as a high temperature film dielectric. A polypyromellitimide film similar to the U.S. H-film was prepared from pyromellitic anhydride and bis(4-aminophenyl) ether:

$$\begin{array}{c} \text{O} \quad \text{CO} \quad \text{O} \\ \diagdown \quad \diagup \quad \diagdown \quad \diagup \\ \text{CO} \quad \text{N} \quad \text{CO} \quad \text{O} \end{array} + \text{H}_2\text{N}-\text{R}'-\text{NH}_2 \rightarrow \left[\begin{array}{c} \text{HO}-\text{CO} \quad \text{CO}-\text{OH} \\ \diagdown \quad \diagup \\ -\text{NH}-\text{CO} \quad \text{CO}-\text{NH}-\text{R}'- \end{array} \right]_n \rightarrow \left[\begin{array}{c} \text{CO} \quad \text{CO} \\ \diagdown \quad \diagup \\ -\text{N} \quad \text{N}-\text{R}'- \end{array} \right]_n$$

 Card 1/2 UDC: 541.6

L 11235-66

ACC NR: AP6002214

Polycondensation to the polyamido acid intermediate was carried out at 15C. Poly-pyromellitimide films were prepared by drying solutions of the polyamido acid on glass substrates at 20—40C followed by heat treatment at 80—400C to produce imidization. Optimum preparative conditions were determined. The films were transparent, gold-brown in color, thermally stable, nonburning at up to 600—700C, unaffected by organic solvents, highly resistant to γ - and UV radiation, low temperature resistant, nonshrinking, resistant to humidity, and readily metalized. In its mechanical properties at high temperatures, the material surpasses all existing polymers. These properties can be further improved by orientation stretching, after which they approach those of glass-reinforced plastics and metals. Orig. art. has: 5 figures and 3 tables. [SM]

SUB CODE: 11/ SUBM DATE: 08Mar65/ ORIG REF: 008/ OTH REF: 011/

ATD PRESS: 4173

Card 2/2

ACC NR: AP6032081 (AN) SOURCE CODE: UR/0183/66/000/005/0020/0023

AUTHOR: Rudakov, A. P.; Bessonov, M. I.; Koton, M. M.; Florinskiy, F. S.

ORG: Institute of Macromolecular Compounds, AN SSSR (Institut vysokomolekulyarnykh voyedineniy)

TITLE: Physical and mechanical properties of fibers obtained from polypyromellitimide

SOURCE: Khimicheskiye volokna, no. 5, 1966, 20-23

TOPIC TAGS: synthetic fiber, polypyromellitimide

ABSTRACT: The possibility of obtaining fibers from polypyromellitimide has been studied. It was found that heat-resistant, high-modulus, nonshrinking fibers could be obtained under laboratory conditions from polypyromellitimide. Their physical and mechanical properties are found to be considerably better than those of mass-produced heat-resistant fibers. Polypyromellitimide fibers apparently can be used to produce high-temperature cord and textiles, and also filler for plastic materials and textolites. Orig. art. has: 3 figures.

SUB CODE: 11/ SUBM DATE: 24May55/ ORIG REF: 007/ OTH REF: 008/

Card 1/1

UDC: 677.494.674

ACC NR: AP7001410

(A, N)

SOURCE CODE: UR/0413/66/000/021/0110/0111

INVENTOR: Koton, M. M.; Adrova, N. A.; Dubnova, A. M.; Bessonov, M. I.;
Rudakov, A. P.

ORG: none

TITLE: Preparative method for polyimides. Class 39, No. 188005 [announced by the
Institute of Macromolecular Compounds AN SSSR (Institut vysokomolekulyarnykh
soyedineniy AN SSSR)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 21, 1966,
110-111

TOPIC TAGS: polyimide^{resin}, elasticity

ABSTRACT: An Author Certificate has been issued for a preparative method for polyi-
mides, involving the polycondensation of pyromellitic anhydride and an aromatic
diamine. To produce polyimides exhibiting high elasticity, hydroquinone bis(4-amino-
phenyl) ether is used as the amine. [SM]

SUB CODE: 07, 11/ SUBM DATE: 07Jan65/ ATD PRESS: 5109

Card 1/1

UDC: 678.675.002.2

ACC NR: AP6035661 SOURCE CODE: UR/0105/66/000/011/0084/0085

AUTHOR: Rudakov, A. P. (Engineer); Bessonov, M. I. (Engineer);
Koton, M. M. (Engineer); Florinskiy, F. S. (Engineer)

ORG: Institute of High-Molecular Compounds, AN SSSR (Institut
vysokomolekulyarnykh soyedineniy AN SSSR)

TITLE: Lacquer-film multilayer capacitor with homogeneous polyimide dielectric

SOURCE: Elektrichestvo, no. 11, 1966, 84-85

TOPIC TAGS: electric capacitor, polyimide

ABSTRACT: Based on Soviet and American (Plastics Technology, v. 8, no. 12, 1962) published data, mechanical and electrical characteristics of polyimides, polyethylene terephthalate, and polyarylates are tabulated. Experimental 4-layer capacitors were prepared by alternatively spraying layers of a polyimide and a

Card 1/2

UDC: 621.319.4:621.315.616.9

ACC NR: AP6035661

metal onto a glass backing, stripping the resulting film capacitor and rolling it into a tubular form. The experimental models had these characteristics: specific volume, 1-2 cm³/mF; capacitance, 100000 pF with a layer thickness of 2-4 μ ; breakdown voltage, 20-50 v; $\tan \delta$ at +20+300C, at 50 cps, 0.01. Low breakdown voltages were, apparently, due to organic inclusions (dust) in the polyimide layers. Orig. art. has: 2 figures and 1 table.

SUB CODE: 09 / SUBM DATE: 09Nov65 / ORIG REF: 006 / OTH REF: 004

Card 2/2

ACC NR: AP7002974

(A)

SOURCE CODE: UR/0413/66/000/024/0070/0070

INVENTOR: Adrova, N. A.; Bessonov, M. I.; Dubnova, A. M.; Koton, M. M.; Moskvina, Ye. M.; Rudakov, A. P.

ORG: none

TITLE: Preparative method for polyimides. Class 39, No. 189574 [announced by Institute of Macromolecular Compounds, AN SSSR (Institut vysokomolekulyarnykh soyedineniy AN SSSR)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 24, 1966, 70

TOPIC TAGS: polyimide, heat resistant material, elastic material

ABSTRACT:

An Author Certificate has been issued for a method of preparing polyimides having high elasticity and high heat resistance. The method involves polycondensation of 3,3',4,4'-biphenyltetracarboxylic dianhydride with hydroquinone bis(4-aminophenyl ether).

SUB CODE: 11/ SUBM DATE: 18Oct65/ ATD PRESS: 5112

Card 1/1

UDC: 678.675

KARTAMYSHEV, N.B.; BESSONOV, M.P., red.; BABAKHANOV, A., tekhn. red.
[Intraplant business accounting] Vnutrizavodskoi khoziaistven-
nyi raschet. Tashkent, Gos.izd-vo UzSSR, 1962. 32 p.
(Finance) (MIRA 16:4)

NASYROV, B.; SHCHEKIN, V.A., zasl. deyatel' nauki i tekhniki Uzbekskoy
SSR, prof., spets. red.; ~~BESSONOV, M.P.~~, red.; BAKHTIYAROV, A.,
tekh. red.

[Karakul sheep on state farms in Uzbekistan] Karakulevodstvo v
sovkhozakh Uzbekistana. Tashkent, Gosizdat UzSSR, 1962. 133 p.
(Uzbekistan—Karakul Sheep) (MIRA 16:5)

KAMILOV, Kabir; BESSONOV, M.P., red.; BABAKHANOV, A., tekhn. red.

[Planning and budgeting and financing operations of a
regional Soviet] Planirovanie i biudzhethno-finansovaya
rabota raionoveta. Tashkent, Gosizdat UzSSR, 1962. 37 p.
(MIRA 16:4)

(Local finance)

SATYBALDYEV, I.; BESCHNEV, M.P., red.

[At the sources of life; from the work practice of the
Yangiyul' Agricultural Administration] V glubinakh zhizni;
iz opyta raboty Yangiyul'skogo proizvodstvennogo uprav-
leniia. Tashkent, G. izdat. UzSSR, 1963. 71 p.
(MIRA 17:9)

DEMIN, Nikita Stepanovich, General-leutenant; BESSONOV, M.P., red.;
SALAKHUTDINOVA, A., tekhn. red.

[Indissoluble unity] Nerushimoe edinstvo. Tashkent, Gos-
izdat UzSSR, 1963. 86 p. (MIRA 17:1)

1. Chlen Voennogo Soveta Turkestanskogo voennogo okruga
(for Demin).

83650

S/058/60/000/008/008/009
A005/A001

24.1800

Translation from: Referativnyy zhurnal, Fizika, 1960, No. 8, p. 346, # 21242

AUTHOR: Bessonov, M.V.

TITLE: Measuring Ultrasonic Speed and Absorption ¹¹ in Fusions at High Temperatures

PERIODICAL: V sb.: Primeneniye ul'traakust. k issled. veshchestva. No. 8, Moscow, 1959, pp. 137-146

TEXT: The author presents results from measuring the dependences of speed and absorption of longitudinal ultrasonic waves on the temperature in fusions of glasses, nitric salts, and colophony. The measurements were carried out at 500-1,100°C temperature (for glass fusions) and 30-500°C (for fusions of nitric salts and colophony), which correspond to the vitrification regions of the substances mentioned. The speed and absorption were measured at the frequencies 0.66; 1.3; 2.3 Mc by the pulse-phase and pulse methods. The ultrasonic wave speed in all investigated substances decreased by about 1.5 - 2 times in the vitrification regions with increasing temperature; that is connected with increasing compressibility of the substances. The temperature dependences of the

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83650

S/058/60/000/008/008/009
A005/A001

Measuring Ultrasonic Speed and Absorption in Fusions at High Temperatures

absorption coefficient of ultrasonic waves revealed relaxation maxima, the heights of which were approximately proportional to the ultrasonic wave frequency. The maximum shifted to the region of lower temperatures when the frequency was lowered. The temperature dependences of the thermal conductivity coefficient of the corresponding substances were estimated on the basis of the temperature dependences of the ultrasonic wave speed using the known theoretical correlations. There are 13 references.

I.A. Viktorov

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

BESSONOV, M. V., Cand Phys-Math Sci -- (diss) "Research into the propagation of ultrasonics in fusions of glass-forming substances and the application of acoustic data in the calculation of conduction-radiation heat exchange." Moscow, 1960. 15 pp; (Ministry of Education RSFSR, Moscow Oblast Pedagogical Inst im N. K. Krupskaya); 150 copies; price not given; (KL, 27-60, 147)

24.1800

68215

~~24 (1), 28 (5)~~

S/032/60/026/01/035/052

AUTHOR: Bessonov, M. V.

B010/B006

TITLE: Instrument for Measuring Velocity and Absorption of Ultrasonics
in Melts at High Temperatures 71

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol 26, Nr 1, pp 103 - 106 (USSR)

ABSTRACT: An ultrasonic pulse generator designed for measurement of ultrasonic velocity and -absorption at temperatures of around 1000° is described. The ultrasonic velocity can be measured both at slight- and at higher absorption. Measurements were carried out for various substances, among them for fused nitrite-nitrate mixtures used as coolants (Ref 3). The melt to be tested is contained in a metal crucible into which two metal rods are inserted, one from below, and one from above (Fig 1, scheme of device). The lower rod is connected with an emitter, and the higher with a receiver. The distance between the two ends of the rods (in the melt) can be adjusted by means of a micrometer screw and is measured by an indicator. The emitter is excited by a sound pulse generator. To measure the ultrasonic velocity in glass melts, the pulse phase method is applied. For this, a second pulse generator is used, which generates pulses inter-

Card 1/2

68215

Instrument for Measuring Velocity and Absorption
of Ultrasonics in Melts at High Temperatures

S/032/60/026/01/035/052
B010/B006

fering with the sounding pulses. As can be seen from the circuit scheme (Fig 2) of the instrument, the synchronizing generator is assembled according to the scheme of a multivibrator and a 6N8 triode, and the pulse generator with a TG 0.1/0.3 thyatron. Bariumtitanate lamellae are used as emitter and receiver. The amplifier of the receiver contains 6Zh4 tubes assembled according to the scheme of a DGTs-4 detector, which contains 6P9 tubes. For velocity measurement in slightly absorbing media, a phantastrone with a 6A7 tube is applied. Measurement results obtained for sodium glass melts are represented graphically (Fig 3). According to G. M. Bartenev (Ref 9), the similar characters of the temperature function of the ultrasonic velocity and -absorption in melts of polymers and sodium silicate glass can be explained by the similar structure of these melts. There are 3 figures and 9 references, 7 of which are Soviet.

ASSOCIATION: Moskovskiy aviatsionnyy institut im. Ordzhonikidze (Moscow
Aviation Institute imeni Ordzhonikidze)

Card 2/2


S/263/62/000/010/009/013
I023/I250

AUTHOR: Bessonov, M. V.

TITLE: Use of ultraacoustic data for the calculation of the thermal conductivity of glassy substances at high temperatures

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk. 32. Izmeritel'naya tekhnika, no. 10, 1962, 4, abstract 32.10.340. In collection "Primeneniye ul'traakust. k issled. veshchestva". no. 13, M., 1961, 165-170

TEXT: The determination of the true values of the thermal conductivity of semitransparent glassy substances at high temperatures is rendered difficult by the influence of radiative heat transfer. The thermal conductivity λ of semitransparent substances can be found from acoustic data on the basis of the Debye or Bridgman formulae connecting λ with the mean velocity of the elastic waves. An investigation of the velocity of propagation of ultrasound in glassy substances (colophony and sodium-silicate glass) with a view to determine their λ , is described. The velocity of the thermal elastic waves U_{ω} (velocity at frequency $\nu \rightarrow \sim$) in a melt deviates substantially, due to the relaxation dispersion, from the velocity of the ultrasound. To a first approximation U_{ω} can be determined by a linear extrapolation of the velocity in a solid substance for high temperatures. This method was tested on a substance with a known value of λ (colophony) and used for the study of silicate



Card 1/2

Use of ultraacoustic data for...

S/263/62/000/010/009/013
1028/1250

glasses The calculation, conducted by the Debye, Bridgman and Predvoditelev-Varhaftig formulae, does not give the considerable increase in λ with temperature, observed in the direct experimental determination of λ , when distortions caused by the radiative heat exchange are present. The temperature dependence of λ of silicate glasses is best represented by the Debye formula. There are 4 figures and 11 references.



[Abstracter's note: Complete translation.]

Card 2/2